DESIGN AND IMPLEMENTATION OF RECRUITMENT MANAGEMENT SYSTEM BASED ON ANALYSIS OF ADVANTAGES AND DISADVANTAGES OF PHP THREE-TIER

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Abstract - The purpose of this text is to design the three-tier architecture based on PHP to realize enterprise recruitment management system. The recruitment system was designed and implemented considering new features in the current recruitment work and according to the understanding of recruitment. The advantages and disadvantages of the PHP language were analyzed, and system design and implementation methods were discussed based on the analysis on the advantages and disadvantages of the three-tier architecture of PHP and researches on driver models. On the basis, we choose the most reasonable design drive way. According to the features of the current recruitment management system in enterprise, we design and realize a recruitment management system for enterprise. According to the actual recruitment work, the system is divided into four modules, recruitment system, talent recruitment database system, examination database system and access control system. This study introduces functions and function implementation of the four modules as well as functions and function implementation of their submodules. The system can normalize and systemize recruitment process, greatly reduce working load of workers, improve working efficacy, shorten recruitment time and lower cost spending on recruitment work.

Keywords: Recruitment system; PHP; three-tier architecture.

1. Introduction

With the rapid development and popularization of the Internet and personal computers, more and more job seekers are inclined online job-seekers, while many urban labor markets and the company’s human resources department have also used online recruitment, and each set up their own human resources databases, these changes bring out great changes in the traditional job market management and informatization work and has taken on new characteristics. These changes also put forward new requirements for job recruitment, making network-based job recruitment work become necessary means of advertisement [1-3]. As a kind of open source software, PHP has many obvious advantages in aspect of webpage development, such as high security, cross-platform, supporting for a wide range of databases, fast implementation, and many other advantages [4]. Three-tier architecture development mode is the mature development way of the current Internet, namely in the program development and design, the system of the whole business application is divided into three layers: presentation layer, business logic layer and data access layer. Through layer development, functions in various levels become clear and all layers have adapted to strong independent development, which is beneficial for development, maintenance, deployment and expansion of system [5]. This study simplified the process based on theory to design and realize recruitment system in enterprise. We realized a system involving establishment of recruitment requirements, examination and approval, information release, sorting, screening, hiring, and tracking according to recruitment process of an enterprise. We attempt to set up a recruitment system that meet personalized needs of internal recruitment, and recruiting process in enterprise, thus to realize office automation in enterprise. Moreover, the influence scope of recruitment information was expanded through the large online intermediary platforms and school forums and information of recruiters were collected. Then we screened recruiters as well as arranged written examination, interview and admission work. After the recruitment, we tracked and analyzed the candidates, including the current job and work within half a year and one year of recruiters. Moreover, talent analysis database was built to analyze these data, aiming to provide data references and recommendations for future recruitment.

2. Overview of PHP

PHP as a kind of open source software has many obvious advantages in Web page development [4].
(1) High safety: PHP belongs to open source software, that is to say, PHP core architecture and the source code is open to the public and programmer can view all of
source file content through the corresponding software compile tools. As the utilization rate of Apache server software is very high, most of the developed PHP software or web sites are used with the Apache service. Programs or software compiled by PHP can run on most platforms in the world. Therefore, flexibility and safety of combined use of them has been confirmed by users.

(2) Cross-platform: PHP support almost all of the operating system platforms (such as Win32 or UNIX/Linux/Macintosh/FreeBSD/OS2, etc.), as well as Apache, IIS and various Web server.

(3) Support for a wide range of databases: PHP can be compiled into a function connected to many database and can manipulate a variety of mainstream and non-mainstream database, such as MySQL, Access, SQL Server, Oracle, DB2, etc.

(4) Fast exertion: procedure code compiled using PHP is characterized by high operation efficiency and less data utilization, thus it operates fast.

(5) Easy to learn: the writing of PHP code is similar to HTML, elements on the page is composed of HTML. Page elements composing of HTML are embedded with code. At the same time, JS script language is used to do interactive operation. It is easy to learn as long as there is the basis of HTML code.

(6) Low cost: in the enterprise application scheme based on PHP, the use of the related tools and deployment environment is free, saving a lot of unnecessary spending for the enterprise.

(7) Template: separate application logic and user interface.

(8) Stable and rapid performance: embedded Zend acceleration engines.

(9) Support object-oriented: object orientation is the most popular and common development way of today’s software development and PHP also provides a good support for it, such as creating a class or class libraries and closing up partially. Using object-oriented idea for PHP application development will play a very important significance role in the application architecture design.

To sum up, PHP, a small and medium sized application system characterized by easy to learn, multiple development tools, fast development cycles and highly portable, is suitable for low-cost and short-development and construction period medium and small application system [6-8].

3. The whole system module design

System design is another important stage in the information development process. In this phase, we will design the new system according to logic analysis results in the last stage and based on requirement of logic model. System architecture design is the design of specific physical models. The main goal of this phase is to change system logic programming that reflects the information needs of users into something that can be implemented by computer-based physical scheme, and provide the necessary technical information for the next phase of the system.

This system uses the structured design method to realize the system’s overall function, improve each indicators of the system, reasonable divided whole system into each function module, correctly process relationships between modules, relationships inside modules as well as the invocation relationship and data link, define the internal structure of each module, and achieve the function of the whole system through design of module and correlation between modules. Figure 1 is overall function module structure of system.

Fig.1 Overall function module structure of the system

4. System design and implementation in detail

4.1 Database connection configuration

Operating and managing database composing recruitment information is very important. It can be regarded as the foundation of recruitment management system in enterprise. Realization of the other functions is built on these bases. In this system, in order to make configuration of database connection, we put the database creation connecting process in a separate header file (web. config), hence it is easy to realize the information sharing between databases. In addition, ADO.NET technology applied in the system operates conveniently, only concise sentences are enough. For example, in Web config file, we only need to create a ConnectionStrings object responsible for the connection to the system database. Only the following connection parameters are needed to complete the operation.

1. DSN: data source.
2. UID: user name to access the database.
3. PWD: UID and the corresponding password.

The system also uses the MYSQL database connection. When using this connection method, we should first add a data source named job in the MYSQL Control Panel of the system (the corresponding user name is “jj”, password is “123456”). Afterwards, we can access to database through three parameters.
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Features: database connection management. Code is as follows:

```csharp
<% set corm=Server.CreateObject("ADODB.Connection") conn.open "dsn=job;uid=jj;pwd=123" %>
```

In other pages of the system, we can access to database using connection object by adding statements of the head of the page (`--#
include file="corm/Web.Config "--`).

### 4.2 Detailed design and implementation of system login

Any management personnel in the business module of system management before operation are required by system validation. Login function will initialize system management pages according to corresponding counterpart of different landers, i.e., hide the unprivileged operation functions and display the relevant operational menu items. This system adopts the safe way to log in. Login box appears once user enters the website. The next step is to fill user name and password and then click on the login button. Back-stage management page will come up after the information is verified. If login authentication failed, the corresponding error message will come up. The following shows the flow chart of function implementation.

Key code:

### 4.3 Detailed design and implementation of recruitment management module

Recruitment management module design is mainly divided into two levels, level 1 for classification and level 2 for template option under specific classification. This data structure design is reasonable in data business operations and the front desk page display. Moreover, the display is clear and offers good experience for users. The difficult point of this module lies in how to traverse template options which display based on two-level classification. Here two circular list controls will be used. One is as a container displaying all level 1 category in system and the other one is applied to display template item under that category. Circular list of level 1 category is traversed first. Then all items chosen by user under circular list of the level 1 category is acquired and temporarily stored in complex. It continues until the last list of level 1 category is traversed. Here are the function key codes:

Key codes:

```csharp
try
{
// Select list box, get the selected item
ArrayList list=new ArrayList();
for (int j=0;j<=rtOption.Items.Count; j++)
{
    CheckBoxList ck1Right=(CheckBoxList)rtOption.Items[j].FindControl("ck1Option");
    if (ck1Right.Enabled=true)
        for (int x=0; x<=ck1Right.Items.Count; x++)
        {
            if (ck1Right.Items[x].Selected=true)
                list.Add(ck1Right.Items[x].Value);
        }
}
catch (CMException cmn)
{
// Business exceptions, picture processing
SPUtils.CMExceptionTeardown(cmn, IblError, imgError); }
catch (Exception ex)
{
// System exceptions, common exception handling
SPUtils.ExceptionTeardown(Session, Response, ex); }
```

The release of recruitment information and the reception of resumes from interviewees are the premises for realizing talent screening. The first step of logic process of talent screening is to select out talents whose conditions conform to the position description and test them with written examination. Then a certain proportion of talents who participate in written examination were selected out for interview. Finally talent who is suitable for the position can be confirmed. In the process of implementation, the operations are not complex.

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4.4 Detailed design and implementation of talent management module

Talent management module design is mainly divided into personnel information management, daily management, and integrated query. Personnel information management is an indispensable part of recruitment system. Recruitment system’s main function is to provide the talented person for enterprise. This function module is used to manage talent information in enterprise. As a result, talent information has multiple attributes such as basic information, opinion, the current position, and so on. There are a lot of properties under each large point, leading to large information amount. In addition, there are two main sources of talent information in the system. One way is the direct delivery of applicant into talent database, which should be reviewed by relevant department of and the other way to input by relevant staff.

Following is the function implementation key code:

Key code:

```java
if (e.File.FileName != "") {
  string path = @"~\" + SPConstants.UPLOAD_PICTURE_DIRECTORY; // Randomly generated file names

  string Folder = DateTime.Now.ToString("yyyyMMdd"); // File names are generated according to the date

  newImgName = DateTime.Now.ToString("yyyyMMddHHmmssfff") + e.File.FileName;

  string SavePath = HttpContext.Current.Server.MapPath(path + Folder); // Gets the absolute path

  if (!Directory.Exists(SavePath)) // Determine if the path exists, if it does not exist, created it
    Directory.CreateDirectory(SavePath);

  e.File.SaveAs(SavePath + "+\" + newImgName); // Save the file
}
```

Talent management means managing and maintaining the current state of talents based on basic talent information. Taking the recruitment of talents as an example, this section explained the implementation of the function. The first step is to enter the page of talents list which demonstrates all talents information page by page. After entering into the page, users can select check box in front of every record according to demand. After selection, users can enter into relevant business operation page by right clicking operation button on the right corner of the list and fill in and save information. Following is the key code to realize this feature:

Key codes:

```java
// Pop up talent selection box
function ShowUploadPic() {
  var selectInfo = ShowModulePage("..\ShowPage\SELECTEDInfo.aspx?selectType=1" + 
    &rand=" + Math.randomQ, "590", "300","talent select");

  // receive the returned talents information
  FunctionReceiveParam();

  // Hide frame information
  HideModulePageQ;

  // Update page control value
  document.getElementById("<%=btnRefresh.ClientID %>").click();
```
Due to years of accumulation, the amount of information will increase; hence how users find the needed talent information in such a large amount of information is also an important problem. Therefore, personnel information query function is set up to facilitate the user to find talent information which they need among massive information. The implementation process is as follows. First, information input or selected by users in query page is acquired. Then the information is combined in system page background. After that, the information is transmitted to pre-defined talent comprehensive query and storage process as parameters. Then the information set is returned back to the page to fill data source of list control of the page. Finally, the list will demonstrate talent information page by page. The Following is the key core for the implementation of the function.

Key codes:

```sql
@PageIndex int, -- What page, the first page is 1;
@PageSize int, -- Page size;
@ TotalCount int OUTPUT, -- Total number output parameters;
DECREASE @StartRowNum int;
DECREASE @EndRowNum int;
SET @StartRowNum = (@PageIndex-1)*@PageSize+1;
SET @EndRowNum = @PageIndex*@PageSize;
SELECT
@TotalCount = COUNT (1)
FROM tableName
WITH Temp AS
( SELECT TOP (@PageSize* )@ PageIndex) ID, ROW_NUMBER() OVER (ORDER BY ID DESC) AS RowNum
FROM tableName )
SELECT * FROM Temp AS T
INNER JOIN tableName tb ON T.Id = tb.Id
WHERE T.RowNum BETWEEN @StartRowNum AND @ EndRowNum
ORDER BY RowNum
```

4.5 Detailed design and implementation of examination database management module

Examination database management module design is mainly divided test question information management and test paper information management.

As the basis of test, the test information management is also very important. At present, the system mainly provides three type question categories, multiple-choice question, single-choice question and essay question. The three categories are the most common in the perspective of the question category in current test. So in the process of adding questions, the first thing is to select question category, because only after question category is chosen can the system display test question items and answer elements. Elements showed in page are different according to different question category. Next is question categorization. Corresponding management module in value system of the field will be responsible for it. The classification system will fill based on categories that have been added into the database. The last step is to fill the basic information of the question such as category, title and answer.

Test information management module is mainly used for written examinations during recruitment and internal performance assessment. Before written examination, recruiters can generate a set of test paper according to the position and print it out. The difficult point during the generation of test paper is the selection of test questions. Currently, the system provides two kinds of test question selection means. One is to randomly extract test questions using the system and the other is adding test questions by staffs. A test question selection page which demonstrates information of all test questions will come up and then operators only need to test questions they needed. But as it is a cross-page operation, how to send the selected test question information to the generation page is the key of the implementation of the function.

4.6 Detailed design and implementation of permission management module

Rights management module is divided into the following two main points: roles and permissions management, user management.

Roles and permissions management is considered playing a crucial role in ensuring the security of the whole system. Target system realizes the function by connecting right, role and user together. That means, right is not directly corresponding to user; a role is added between them. Role connects user and right. Right function can be implemented in this way. Moreover, the flexibility is large, which is beneficial for expansion of right demand afterwards.

User management refers to managing system operators. The settlement of role, i.e., the settlement of permission is the most important. Here the settlement of permission is realized by role. Role connects permission and moreover user connects role; as a result, user indirectly connects permission.

Using such a mechanism, the maintenance of user information becomes simple. When adding or maintain user information, we only need to select the role which is added in the system in advanced.
5. Conclusion

This study analyzes the technology used and advantages and disadvantages of programming language, servers and database, explores PHP three-tier structure in detail, discusses over several development patterns and compares their advantages and disadvantages. Based on the above, we make a design research on systematic structure, data mode and right model.

After the basic research work and design work are over, we implement and verify the system. Procedures of recruitment are verified in detail. Finally, advantages and disadvantages of the system are compared and analyzed. Then various functions of the recruitment system are prospected.

Recruitment as the main source of human resources in enterprise, directly affects the quality of employees and development potential. An excellent staff will play an important role for development of enterprise. A good recruitment system also will play a good role in screening excellent talent. Besides recruitment system, a set of good evaluation system and employee incentive mechanism is also needed to full play the employee’s supervisor initiative and create greater value for enterprise. At the same time a good set of personnel flow statistical analysis and staff growth plan is also essential. Timely knowing the staff flow and understanding employee’s demand can ensure the loyalty of staff to enterprise. Human resource structure composing of good recruitment system, outstanding job evaluation systems, sensitive staff flow analysis and potential employee growth plan can ensure rapid and high-efficient development of enterprise on the basis of stable operation.

Meanwhile, it can improve competitiveness of enterprise and enhance development potential of enterprise. Thus, a good recruitment and human resource management system can not only reduce recruitment costs and increase efficiency in the recruitment process but also can ensure stable operation and constant development of enterprise.

6. Reference